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Responsive to 12 July 2006 Office Action

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REMARKS

This paper is responsive to any paper(s) indicated above, and is responsive in any other manner indicated below.

DISCLOSURE/SPECIFICATION AMENDMENT(S)

Any spelling, idiomatic, grammatical and/or other informality noted during further review of the disclosure/specification have been corrected.

WITHOUT PREJUDICE OR DISCLAIMER

Applicant respectfully submits that any claim amendments, cancellations and/or additions made within the present paper, are made without prejudice or disclaimer.

PENDING CLAIMS

Claims 1-9 were pending in the application. Appropriate claims have been amended, canceled and/or added (without prejudice or disclaimer) in order to adjust a clarity and/or focus of Applicant's claimed invention. That is, such changes are unrelated to any prior art or scope adjustment and are simply refocused claims in which Applicant is present interested. At entry of this paper, Claims 1-15 will be pending for further consideration and examination in the application.

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REJECTION(S) UNDER 35 USC '103

The 35 USC '103 rejection is respectfully traversed. However, such rejections have been rendered obsolete by the present clarifying amendments to Applicant's claims, and accordingly, traversal arguments are not appropriate at this time. However, Applicant respectfully submits the following to preclude renewal of any such rejections against Applicant's clarified claims.

All descriptions of Applicant's disclosed and claimed invention, and all descriptions and rebuttal arguments regarding the applied prior art, as previously submitted by Applicant in any form, are repeated and incorporated hereat by reference. Further, all Office Action statements regarding the prior art rejections are respectfully traversed. As additional arguments, Applicant respectfully submits the following.

In order to properly support a §103 obviousness-type rejection, the reference not only must suggest the claimed features, but also must contain the motivation for modifying the art to arrive at an approximation of the claimed features. However, the cited art does not adequately support a §103 obviousness-type rejection because it does not, at minimum, disclose (or suggest) the following limitations of Applicant's clarified claims as discussed in comments from Applicant's foreign representative in support of the patentability of Applicant's invention.

Applicant's disclosed and claimed invention is directed toward trim-treat arrangements which treat lateral edge roughness laterally along vertical mask sidewalls, and which utilize a calculator which automatically calculates a trim-treat time for ultimately achieving a target width.

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More particularly, it is noted that Applicant's FIGS. 10A (reproduced herewith) is a top view (i.e., above vertical mask sidewalls) showing undesirable lateral edge roughness laterally along vertical mask sidewalls. In contrast, FIG. 10B (reproduced herewith) is a top view showing improved lateral edge roughness laterally along the vertical mask sidewalls.

FIG.10A

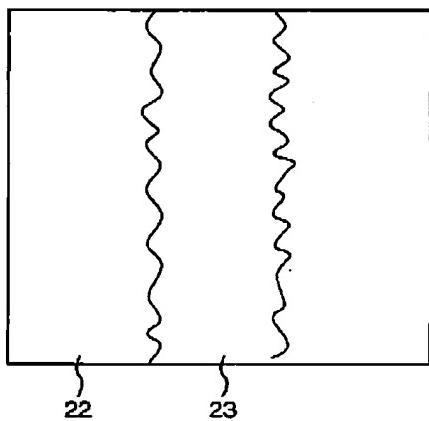
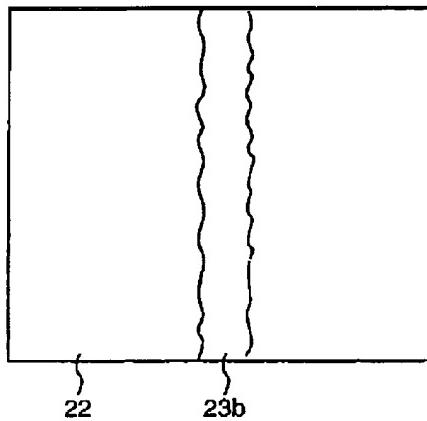


FIG.10B



Further, FIG. 10B's mask 23b is at a reduced target width. In order to provide proper trim-treat timing, Applicant's invention includes for example (claim 10), "trimming condition calculating means for calculating a condition required for said trimming treatment to obtain a desired mask width on the basis of a precedently measured width dimension of said patterned mask and a precedently measured amount of lateral edge roughness laterally along vertical mask sidewalls, as well as the amount of radicals measured by said plasma monitor, wherein the trimming treatment is carried out for the trimming condition calculated by said trimming condition calculating means." Other ones of Applicant's claims have similar features/limitations.

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Turning now to rebuttal of the art, and in particular, the Rauf article, it is respectfully noted that Rauf is deficient in at least two regards. First, it appears that Rauf is not directed to treating lateral edge roughness laterally along vertical mask sidewalls, and is instead directed toward treating roughness in a vertical direction. More particularly, it is noted on page 256 of Rauf, right-hand column, first full paragraph, that one type of lateral edge roughness (i.e., "vertical striations" along the lateral length of a sidewall) is mentioned, and then such paragraph goes on say that "...the two-dimensional model considered in this article will not apply to this type of roughness."

As a second deficiency, Rauf nowhere teaches a calculating arrangement for calculating trimming conditions for ultimately arriving at a target width. With respect to the primary Kagoshima et al. reference, such reference (whether taken alone, or in combination with Rauf) does not cure the deficiencies mentioned above with respect to the Rauf reference.

In addition to the foregoing, the following additional remarks from Applicant's foreign representative are also submitted in support of traversal of the rejection and patentability of Applicant's claims.

The Examiner rejects all claims 1-6 as being unpatentable over the combination of Kagoshima et al and Rauf et al "Modeling the Impact of Photoresist Process Trim Etch Process On Photoresist Surface Roughness", which is referenced in the present specification.

Rauf's Fig.1 shows a cross-sectional view of a photoresist (PR) line. As shown in Fig.1 Rauf calls the indentation of photoresist sidewalls in the direction of PR (gate) height or in the PR vertical direction as "roughness". So, the disclosed

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mechanism and all of characteristic diagrams relate to roughness of PR in the direction of PR height or in the PR vertical direction.

In contrast, Applicants' invention addresses to roughness of a mask member in the direction of the mask length when viewed from the top of a top view of the mask. Refer to Fig.3. This is clear from the top view of a part of mask pattern on a wafer extracted before a trimming treatment. Thus, Applicants' treated roughness is entirely different from that of Rauf in directivity (difference in the direction by 90 degrees) and physical phenomenon.

Therefore, the teaching of Rauf's characteristic diagrams is in no way applicable to the roughness in the length (or lateral) direction of the mask in this invention. This is clear from the explanation of Rauf's physical mechanism that is inversely related to this invention. More specifically, Rauf, page 657, in left column, describes "rough protrusions on the sidewalls get exposed to energetic ions, while can remove the bumps through physical sputtering". This is because Rant relates to roughness in the direction of mask height.

In fact, Applicants' specification, page 14, lines 4-8, discloses that the valley (cavity) of roughness is easy to be etched by ions.

The difference on physical mechanism between Applicants and Rant is due to direction of the mask or photoresist roughness is, that is, due to whether roughness is in the direction of mask height or in the direction of mask length (lateral direction of mask).

Applicants' invention is based on the physical mechanism of edge roughness in the length direction of a mask to be trimmed, which is not disclosed or suggested

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by Rauf. Therefore, the claimed Invention would not be obvious even by combining Kagoshima with Rauf.

As a result of all of the foregoing, it is respectfully submitted that the applied art (taken alone and in the Office Action combinations) would not support a '103 obviousness-type rejection of Applicant's claims. Accordingly, reconsideration and withdrawal of such '103 rejection, and express written allowance of all of the '103 rejected claims, are respectfully requested.

EXAMINER INVITED TO TELEPHONE

The Examiner is herein invited to telephone the undersigned attorneys at the local Washington, D.C. area telephone number of 703/312-6600 for discussing any Examiner's Amendments or other suggested actions for accelerating prosecution and moving the present application to allowance.

RESERVATION OF RIGHTS

It is respectfully submitted that any and all claim amendments and/or cancellations submitted within this paper and throughout prosecution of the present application are without prejudice or disclaimer. That is, any above statements, or any present amendment or cancellation of claims (all made without prejudice or disclaimer), should not be taken as an indication or admission that any objection/rejection was valid, or as a disclaimer of any scope or subject matter. Applicant respectfully reserves all rights to file subsequent related application(s) (including reissue applications) directed to any/all previously claimed limitations/features which have been subsequently amended or cancelled, or to

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any/all limitations/features not yet claimed, i.e., Applicant continues (indefinitely) to maintain no intention or desire to dedicate or surrender any limitations/features of subject matter of the present application to the public.

CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully submits that the claims listed above as presently being under consideration in the application are now in condition for allowance.

To the extent necessary, Applicant petitions for an extension of time under 37 CFR '1.136. Authorization is herein given to charge any shortage in the fees, including extension of time fees and excess claim fees, to Deposit Account No. 01-2135 (Case No. 500.43597X00) and please credit any excess fees to such deposit account.

Based upon all of the foregoing, allowance of all presently-pending claims is respectfully requested.

Respectfully submitted,

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